Track 1 – Projects to Advance Water Supply Workshop

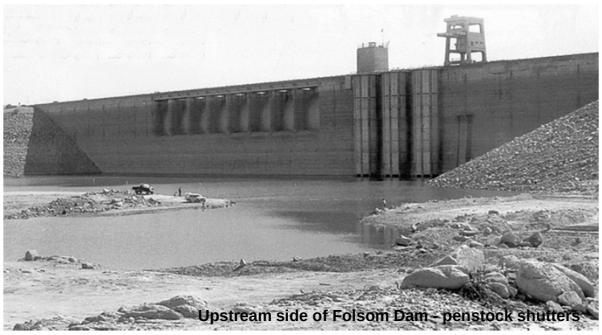
April 26, 2018

Background

- **Jan 2016 – Signed Record of Decision (ROD) on implementing the No Action Alternative in the Environmental Impact Statement (EIS) mandated by Court**
- **The ROD included 2008 and 2009 Biological Opinion Reasonable and Prudent Alternative (RPA) Actions**
- **Aug 2016 – Requested reinitiation of consultation for Coordinated Long-term Operation (LTO) of the CVP and SWP**
- **Dec 2017 – Published Notice of Intent (NOI) to develop EIS on Revisions to the LTO**

Reinitiation Drivers

- **Multiple years of drought**
- **Low populations of ESA listed species**
- **New information as a result of collaborative science processes.**



Upstream side of Folsom Dam – penstock shutters

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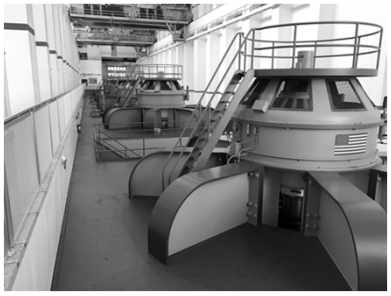
Overall Objectives



- **Fresh Look Concept**
- **Biological objectives**
- **Best available science**
- **Transparency**
- **Data-driven adaptive management**
- **Collaborative Science Coordination**
- **Climate change**
- **Joint (or highly coordinated) non-jeopardy Biological Opinion(s)**

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Three Track Approach

- **Track 1: Near-term actions for water supply**
  - **Completion within a year**
  - **Prior work and limited controversy support the schedule**
- **Track 2: ~18 month programmatic analysis to maximize water deliveries and marketable power**
  - **New storage facilities,**
  - **New conveyance facilities,**
  - **Modifications to existing facilities,**
  - **Changes to regulations, and/or**
  - **Addressing other stressors.**
- **Track 3: Complete the ROC on LTO with one or more site-specific efforts**

Track 1 Action Development

- **January 19 - Delta Brainstorming Workshop held to generate ideas for this near-term effort**
- **February 22 – Meeting with water users to brainstorm initial ideas**
- **Meetings to develop ideas**
- **April 26 – Quarterly Workshop to share list of actions and develop ideas further**

Track 2 Action Development

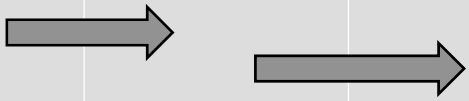
- **Scoping**
  - **Jan. 23, in Sacramento (~100 attendees / 20 verbal comments)**
  - **Jan. 24 in Los Banos (~30 attendees / 3 verbal comments)**
  - **Jan. 25 in Chico (~100 attendees / 30 verbal comments)**
  - **711 combined written and verbal comments**
- **February 28 – Workshop to brainstorm ideas**
- **Meetings to share and develop ideas**
- **June 7 – Quarterly Workshop to share list of actions and develop ideas**

Schedule

Date	Track 1	Track 2	Track 3
January		Scoping	Workshops by Division Integration Workshop
February	Stakeholder and interested party discussions on potential actions.		
March			
April			
May	Proposed Action		
June		Alternatives	
July			
August			
September	Draft NEPA Evaluation		
October			
November			
December	Final NEPA Biological Assessment	Public Draft EIS	
//		//	//
June of 2019		Final EIS Biological Assessment	

Initial Thoughts on Potential Scope(s)

Track 1	Track 2	Track 3
Operations San Joaquin I:E Ratio OMR Flexibility Barriers Fall X2 Studies and Methods Survey Methods Predator Control Rapid Genetics	Programmatic New Storage New Conveyance Existing Facility Modifications Changes to Regulations Other Stressors Process Adaptive Management Incidental Take Methodology Decision Support Groups Site-Specific Potential Additional Operations	System Re-Operation Site-Specific Construction New Biological Opinion(s)



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Track 1 – PAWS

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Track 1

- Projects to Advance Water Supply (PAWS) 🐾
  - Near-term actions for water supply
  - Completion within a year
    - Final Environmental Assessment and Endangered Species Act Consultation by the end of December 2018
  - Prior work and limited controversy to support the schedule
- **Objective:** Improve water supply in a way that does not create additional adverse effects to listed species

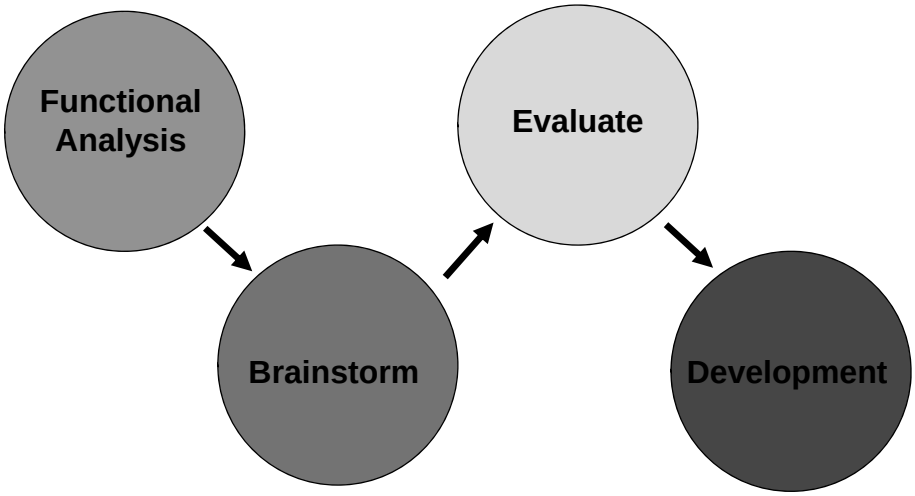
Track 1 Outreach and Schedule

- January – March: Generate ideas with interested parties
  - Delta Brainstorming Workshop – January 19
- **Today – Workshop**
- June: Workshop on Analysis
- August: Workshop on Environmental Assessment (EA)
- October: Workshop on comments on draft document
- December: Final EA and ESA package

Objectives for Today

- Additional ideas
- Additional science / background material
- Opportunities (advantages)
- Risks (disadvantages)
- Idea refinement

Process



Functional Analysis

HOW – how do you achieve this function

WHY – why do you do this function

WHEN – when you do this function,
what other functions must you do

Brainstorming

Divergent thinking

- Creative process, use imagination
- Initial brainstorming – no bad ideas

Convergent thinking

- Critical thinking, use logic
- Develop and evaluate

Evaluate and Develop

- Think objectively
- Define, simplify and clarify the problem
- Improve communication and consensus
- Discuss advantages and disadvantages
- Develop solutions and refine ideas

Table Topics

- Non-Physical Barriers
- San Joaquin River I:E
- OMR Storm Flexibility
- Studies and Methodologies
  - rapid genetics, predation, eDNA/EDSM
- Fall x2

Table Format

- Explain objective
- Idea proposal
  - Would this proposal cause additional adverse effects?
- Current science/background
- Any modeling results
- Additional ideas/refinements

Track 1 – Ideas

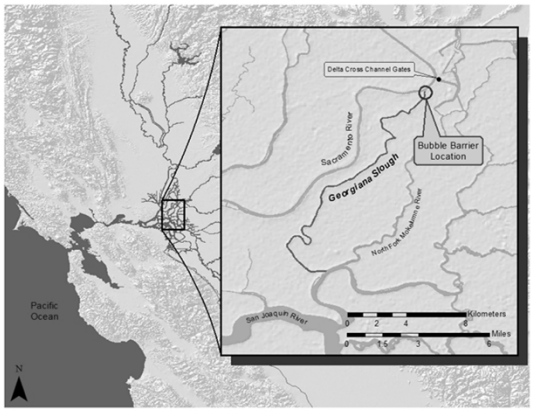
Table Topics

- Non-Physical Barriers
- San Joaquin River I:E
- OMR Storm Flexibility
- Studies and Methodologies
  - rapid genetics, predation, eDNA/EDSM
- Fall x2

Georgiana Slough Non-Physical Barriers

Georgiana Slough Non-Physical Barriers

- High levels of entrainment and predation of out migrating juveniles
- Result in reduced through-Delta juvenile Salmonid survival



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Barriers Background

- **NMFS 2009 BO - RPA IV.1.3**
  - "Consider engineering solutions to further reduce diversion of emigrating juvenile salmonids to the interior and southern delta, and reduce exposure to CVP and SWP export facilities."
- **WIIN Act - 4001(b)(3)**
  - "Collaborate with the California DWR to install a deflection barrier at Georgiana Slough and the Delta Cross Channel Gate to protect migrating salmonids, consistent with knowledge gained from activities carried out during 2014 and 2016."

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Bio Acoustic Fish Fence (BAFF)

- DWR: Pilot study 2011 and 2012
- Low-frequency sound generators
- Bubble curtain
- Strobe lights

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BAFF Study Results

- 2011: BAFF on - reduction of roughly 2/3 of the fish that would have been entrained.
- 2012: BAFF on - reduction of roughly 1/2 of the fish that would have been entrained.
- River flow and cross-stream fish position are the largest influence on entrainment risk
- BAFF operation effects cross-stream fish position by promoting avoidance response (away from BAFF)

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Floating Fish Guidance Structure (FFGS) Results

- DWR Pilot study 2014
- Intermediate flows (~7,000-14,000 CFS): About 1/5 reduction in entrainment
- Higher and Lower flows: resulted in negligible entrainment improvement to measurable entrainment increases
- Overall, flows were considerable lower than anticipated for the study year and may have explained some of the limited effectiveness

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Barrier Ideas

- Other Potential Options
  - Electric barrier/guidance system
  - Light/Auditory
  - Infrasound Fish Fence
  - Fish Screen
  - Fish Guidance Wall
  - Rock Barrier
  - Chemical Toxicants
- Idea for Track 1: Routing through Other Sloughs
  - Steamboat and Sutter sloughs

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San Joaquin River Inflow:Export Ratio

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I:E Ratio Background

- **NMFS RPA Action IV.2.1**

Objective - To reduce the vulnerability of emigrating CV steelhead within the lower San Joaquin River to entrainment into the channels of the South Delta and at the pumps due to the diversion of water by the export facilities in the South Delta, by increasing the inflow to export ratio. To enhance the likelihood of salmonids successfully exiting the Delta at Chipps Island by creating more suitable hydraulic conditions in the main stem of the San Joaquin River for emigrating fish, including greater net downstream flows.

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What is an "I:E Ratio"

- **Water Flow at the Vernalis USGS Water Gage on the San Joaquin River–to- combined exports of the CVP/SWP**

San Joaquin Valley Classification	Vernalis flow: CVP/SWP combined export ratio	Targeted Minimum flow at Vernalis: Minimum export (cfs)
Critically dry	1:1	1,500 : 1,500
Dry	2:1	3,000 : 1,500
Below normal	3:1	4,500 : 1,500
Above normal	**4:1**	**6,000 : 1,500**
Wet	**4:1**	**6,000 : 1,500**
Vernalis flow equal to or greater than 21,750 cfs	N/A	Unrestricted exports until flood recedes below 21,750 cfs

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Baker and Morhardt 2001
Survival of Chinook Salmon Smolts in the Sacramento-San Joaquin Delta and Pacific Ocean

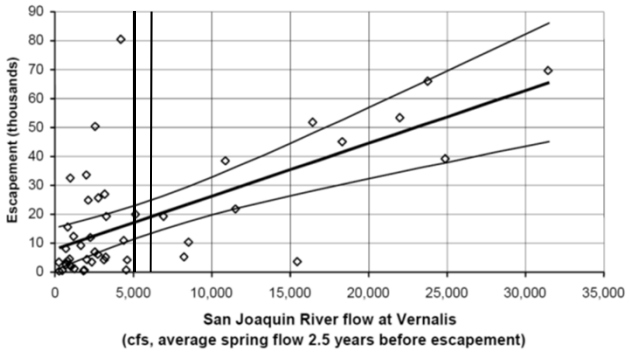

Figure 11 Total escapement to San Joaquin tributaries, 1951 through 1996, and spring flow in the San Joaquin River at Vernalis 2.5 years earlier. Fitted regression line and envelope of 95% confidence region for fitted line are shown.

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I:E Ratio Ideas

- Alternative Ratio
  - 3.3:1 Inflow:Export
    - Approximately 5,000 cfs San Joaquin River flow - 1,500 cfs export
- Minimum flows in San Joaquin River
  - 5,000 cfs – 7,000 cfs

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I:E Ratio

- Science since 2009
  - Inflow: What is needed to move fish out of the system?
  - Exports: What effects are they having on inflow?
  - Which route has the best survival? Predation?
  - What barriers are needed to improve system?
- Knowledge Gaps??
- Other ideas??

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Old and Middle River (OMR) Storm Flexibility

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OMR Background

2008 FWS BO Actions 1,2, 3:

- Action 1 to protect pre-spawning adult Delta Smelt from entrainment during the first flush, Action 2 to protect pre-spawning adults from entrainment and from adverse hydrodynamic conditions, and Action 3 to protect larval Delta Smelt from entrainment.

2009 NMFS 2009 BO Action IV.2.3

- Requires OMR flow management to protect emigrating juvenile winter-run, yearling spring-run, and Central Valley Steelhead within the lower Sacramento and San Joaquin rivers from entrainment into south Delta channels and at the export facilities in the south Delta. Action IV.2.3 requires reducing exports from January 1 through June 15 to limit negative OMR flows to -2,500 to -5,000 cfs.

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OMR Storm Flexibility

- **WIIN Act 4003 – Temporary Flexibility for Storm Events**
  - Maximizing water supplies for CVP and SWP contractors through an operations plan.
  - Operate at levels that result in OMR flows more negative than those prescribed in the 2008 and 2009 BOs to capture peak flows during storm-related events
  - No additional adverse effects on federally listed species
- **Idea** – Develop process to implement storm flexibility operations

Studies and Methodologies

Rapid Genetic Protocol

- NMFS RPA Action IV.2.3 – OMR Flow Management
  - Includes daily older juvenile Chinook density loss thresholds that when exceeded exports are reduced for at least 5 days
  - Based on length-at-date
- Genetic identification is a more accurate estimation of loss at CVP and SWP fish salvage facilities for winter-run Chinook
- Rapid genetic analysis allows for timely discrimination of different races of Chinook salmon that may overlap within the older juvenile size-at-date criteria

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Rapid Genetic Protocol

- NMFS supported the use of this protocol during 2016-2018, with additional conditions:
  - all unclipped Chinook collected at fish salvage facilities were analyzed for genetics
  - annual incidental take limit was set at 1% of natural winter-run
- Currently, the protocol is approved on annual basis
- Idea: establish Genetic Protocol as a long-term commitment
- Allows for more reliable water deliveries when older juvenile Chinook threshold is exceeded, and genetic identification confirms that few fish salvaged are actually winter-run

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Rapid Genetic Protocol – Outcomes

WY 2018

- Older juvenile Chinook loss exceeded 7 times
- Genetics confirmed most were not winter-run
- Loss density was re-calculated to be less than action threshold for all but 1
- Resulting in additional estimated 54 TAF water pumped

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Clifton Court Predator Studies

- DWR removes predators from Clifton Court
  - In compliance with NMFS RPA Action IV.4.2(2)
  - To reduce pre-screen loss at the SWP
- Studies:
  - Determine main factors affecting predator catch
  - Determine pre-screen loss using PIT and acoustic tagging
- Improves water supply reliability by reducing take
- Track 1 ROC: Reclamation assists DWR with NEPA and ESA compliance

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Studies: Clifton Court Forebay Predation

- DWR removes predators from Clifton Court
  - In compliance with NMFS RPA Action IV.4.2(2)
  - To reduce pre-screen loss at the SWP
- Studies:
  - Determine main factors affecting predator catch
  - Determine pre-screen loss using PIT and acoustic tagging
- Improves water supply reliability by reducing take
- Track 1 ROC: Reclamation assists DWR with NEPA and ESA compliance

Studies: Delta Smelt Monitoring

- Enhanced Delta Smelt Monitoring (USFWS)
- Environmental DNA (eDNA)
  - Sediment monitoring
  - Scent-detection dogs
    - Complimentary surveys
    - Pair with trawls
    - Reach shallower areas/sloughs

Photo: H.T. Harvey & Associates

Fall X2

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Fall X2 Background

2008 FWS BO – RPA Component 3 – Action 4: Estuarine Habitat During Fall

- **Objective:** Improve fall habitat for delta smelt by managing of X2 through increasing Delta outflow during fall when the preceding water year was wetter than normal. This will help return ecological conditions of the estuary to that which occurred in the late 1990s when smelt populations were much larger. Flows provided by this action are expected to provide direct and indirect benefits to delta smelt. Both the direct and indirect benefits to delta smelt are considered equally important to minimize adverse effects.

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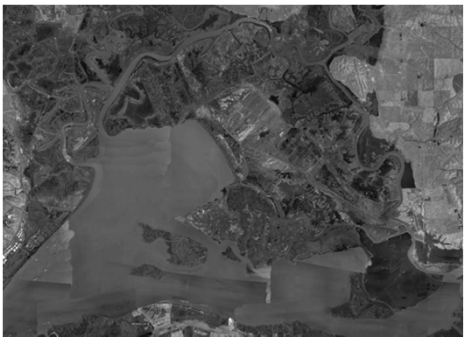
Fall X2 Ideas

- Flexible Operation of Fall X2
  - Modify averaging period to two months to allow for more flexible operations.
  - Allow for 1-3 km variations based on hydrologic conditions, air temperatures, other factors
  - Define future Adaptive Management actions for different scenarios
- Remove December requirement

Fall X2 Ideas – Suisun Marsh Salinity Control Gates

- Re-operate Suisun Marsh Salinity Control Gates and Roaring River Distribution System
- Focus on Sept-Oct Grizzly and Honker Bay habitat following Above Normal and Wet Years



Questions?